

## 2-NITROPROPANE

2-Nitropropane is a federal hazardous air pollutant and was identified as a toxic air contaminant in April 1993 under AB 2728.

CAS Registry Number: 79-46-9

$\text{CH}_3\text{CH}(\text{NO}_2)\text{CH}_3$

Molecular Formula:  $\text{C}_3\text{H}_7\text{NO}_2$

2-Nitropropane is a clear, colorless liquid with a mild, fruity odor. It is soluble in water, alcohol, and ether, and is miscible with many organic solvents. 2-Nitropropane is flammable when exposed to heat, open flame, or oxidizers and may explode when heated in the liquid or vapor form (Merck, 1989; NTP, 1991).

### Physical Properties of 2-Nitropropane

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Synonyms: beta-nitropropane; dimethylnitromethane; nitroisopropane; isonitropropane; propane

Molecular Weight:	89.09
Boiling Point:	120.3 °C
Melting Point:	-93 °C
Flash Point:	24 °C (75 °F)
Vapor Density:	3.06 (air = 1)
Density/Specific Gravity:	0.9821 at 25/4 °C (water = 1)
Vapor Pressure:	20 mm Hg at 25 °C
Log Octanol/Water Partition Coefficient:	0.554
Conversion Factor:	1 ppm = 3.64 mg/m <sup>3</sup>

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(Howard, 1990; HSDB, 1991; Merck, 1989; Sax, 1989; U.S. EPA, 1994a)

## SOURCES AND EMISSIONS

### A. Sources

2-Nitropropane is used as a chemical intermediate, as a solvent in coatings, inks, and cellulose esters, as a stripping solvent for shellac and lacquer, in explosives, in rocket propellants, and in additives to fuel for racing cars and diesel fuels (HSDB, 1991). It has also been detected in tobacco smoke (U.S. EPA, 1994a).

The primary stationary sources that have reported emissions of 2-nitropropane in California

are air transportation and airports, manufacturers of miscellaneous chemical products, and manufacturers of search and navigation equipment (ARB, 1997b).

#### B. Emissions

The total emissions of 2-nitropropane from stationary sources in California are estimated to be at least 2,600 pounds per year, based on data reported under the Air Toxics “Hot Spots” Program (AB 2588) (ARB, 1997b).

#### C. Natural Occurrence

No information about the natural occurrence of 2-nitropropane was found in the readily-available literature.

### **AMBIENT CONCENTRATIONS**

No Air Resources Board data exist for ambient measurements of 2-nitropropane.

### **INDOOR SOURCES AND CONCENTRATIONS**

No information about the indoor sources and concentrations of 2-nitropropane was found in the readily-available literature.

### **ATMOSPHERIC PERSISTENCE**

In the atmosphere, 2-nitropropane will be removed through photolysis and reaction with photochemically-produced hydroxyl radicals (Howard, 1990). Based on the rate constant for the hydroxyl radical reaction for 2-nitropropane, the corresponding half-life is estimated to be 40 days (Atkinson, 1995; Liu et al., 1990).

### **AB 2588 RISK ASSESSMENT INFORMATION**

The Office of Environmental Health Hazard Assessment reviews risk assessments submitted under the Air Toxics “Hot Spots” Program (AB 2588). Of the risk assessments reviewed as of April 1996, 2-nitropropane contributed to the total cancer risk in 1 of the approximately 550 risk assessments reporting a total cancer risk equal to or greater than 1 in 1 million. 2-Nitropropane also contributed to the total cancer risk in 1 of the approximately 130 risk assessments reporting a total cancer risk equal to or greater than 10 in 1 million (OEHHA, 1996a). For non-cancer health effects, 2-nitropropane did not contribute to a total hazard index greater than 1 in any of

the risk assessments reporting a total chronic or acute hazard index greater than 1 (OEHHA, 1996b).

## HEALTH EFFECTS

The probable route of human exposure to 2-nitropropane is inhalation.

**Non-Cancer:** 2-Nitropropane is a central nervous system depressant and is highly hepatotoxic at high exposures. Acute exposure in workers fatally poisoned has been found to cause severe liver damage and some kidney damage. Workers chronically exposed through inhalation developed nausea, vomiting, diarrhea, severe headaches, and pulmonary irritation (U.S. EPA, 1994a).

A chronic non-cancer Reference Exposure Level (REL) of 20 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) is listed for 2-nitropropane in the California Air Pollution Control Officers Association (CAPCOA) Revised 1992 Risk Assessment Guidelines. The toxicological target considered for chronic toxicity is the liver (CAPCOA, 1993). The United States Environmental Protection Agency (U.S. EPA) has established a Reference Concentration (RfC) for 2-nitropropane of  $20 \mu\text{g}/\text{m}^3$  based on liver focal vacuolization and nodules in rats. The U.S. EPA estimates that inhalation of this concentration or less, over a lifetime, would not likely result in the occurrence of chronic, non-cancer effects. The U.S. EPA has not set an oral Reference Dose (RfD) (U.S. EPA, 1994a).

No information is available on adverse reproductive or developmental effects in humans. Fetal toxicity (delayed fetal heart development) was reported in one animal study following injection of 2-nitropropane in rats (U.S. EPA, 1994a).

**Cancer:** No trends indicating increased carcinogenic risk from exposure to 2-nitropropane were reported in one epidemiological study in humans. In one animal study, multiple hepatocellular carcinomas were observed in rats. The U.S. EPA has classified 2-nitropropane in Group B2: Probable human carcinogen. The International Agency for Research on Cancer has classified 2-nitropropane in Group 2B: Possible human carcinogen (IARC, 1987a).

The State of California has determined under Proposition 65 that 2-nitropropane is a carcinogen (CCR, 1996). The recommended preliminary inhalation potency value for use in cancer risk assessments is  $1.3 \times 10^{-3}$  (microgram per cubic meter)<sup>-1</sup>. In other words, the potential excess cancer risk for a person exposed over a lifetime to  $1 \mu\text{g}/\text{m}^3$  of 2-nitropropane is estimated to be no greater than 1,300 in 1 million (CAPCOA, 1993).

